

Organization(s): Brown University

Title: Transport Properties in Micromachined Biofluidic Systems

Duration of Effort: June 2000 – June 2003

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MTO

**Composite
CAD**

Objective

The goal of the program is to identify key difficiencies in the current state of modelling flows of biological fluids in micron-scale devices. These deficiencies arise due to non-Newtonian fluidic effects, non-standard fluid/surface interactions, finite-size molecular effects and other microfluidic phenomena. They represent severe limitations to advanced modelling of biofluidic systems.

As a result of the program, new modelling techniques will be developed, as well as novel methods for fluidic handling, bio-detection and bio-transduction, that utilize the unique characteristics of micro-biofluidic systems.

Technical Approach

- Fabrication of steady and unsteady micromachined test devices
- Numerical modeling of phenomena under different constitutive relations
- Measurement of fluidic properties (rheology, diffusion) in test
- Extraction of appropriate models for numerical simulations

Major Challenges

- Precision manufacturing of test devices and high-accuracy experimental techniques

6th Month Milestones

- Simulation of flow phenomena, design and fabrication of steady flow channels
 - Development and demonstration of steady measurement techniques
 - Biofluid selection
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